

REMARKS

The non-final Office Action was issued on pending claims 1-7. Claims 2, 3, and 5-7 have been withdrawn from consideration as being directed to a non-elected invention. In this Response, no claims have been amended, added, or cancelled. Thus, claims 1-7 are pending in the application, and claims 1 and 4 are under consideration.

Restriction Requirement

In Office Action paragraph 1, a restriction requirement was entered between inventions of Group I, claims 1 and 4 drawn to a pressure sensor, and Group II, claims 2, 3, and 5-7 drawn to a method of manufacturing a pressure sensor. Applicants affirm the oral election to prosecute the invention of Group I, claims 1 and 4. Accordingly, claims 2, 3, and 5-7 stand withdrawn from consideration by the Examiner as being drawn to a non-elected invention.

Amendment to the Specification

The specification has been amended at page 7, line 10, to correct a typographical error. Specifically, the reference number 2 has been replaced with reference number 6 regarding the substrate.

Section 103(a) Rejection of Claims 1 and 4

In Office Action paragraph 3, claims 1 and 4 were rejected under 35 U.S.C. §103(a) as being unpatentable over Ko (US 5,528,452) in view of Okada (US 2002/0014126 A1). Applicants respectfully disagree.

Applicants' invention, as claimed in claim 1, pertains to a pressure sensor. The pressure sensor comprises a silicon structure (5) having a conductive diaphragm (9), the silicon structure (5) being bonded on a substrate (6), which comprises an electrode (7) covered by a dielectric film (8), so that the diaphragm (9) and the electrode are facing each other and there is a gap (10) between the diaphragm (9) and the dielectric film (8), the pressure sensor measuring a pressure applied thereto by detecting capacitance according to the area of a contact face of the diaphragm (9) which touches the dielectric film (8) when the pressure is applied; the concentration of an

impurity at the top face of the diaphragm (9) being equal to or greater than $1 \times 10^{19} \text{ cm}^{-3}$ and less than $9 \times 10^{19} \text{ cm}^{-3}$.

Applicants' invention, as claimed in claim 4, also pertains to a pressure sensor. The pressure sensor comprises a silicon structure (5) having a conductive diaphragm (9), provided by doping of an impurity and anisotropic etching, the silicon structure (5) being bonded on a substrate (6), which comprises an electrode (7) covered by a dielectric film (8), so that the diaphragm (9) and the electrode (7) are facing each other and there is a gap (10) between the diaphragm (9) and the dielectric film (8), the pressure sensor measuring a pressure applied thereto by detecting capacitance according to the area of a contact face of the diaphragm (9) which touches the dielectric film (8) when the pressure is applied; the etch pit density on the top face of the diaphragm (9) being equal to or less than five per μm^2 .

The reference numerals inserted into the text of claims 1 and 4 above are merely for reference purposes for the example of Applicants' invention shown in Figs. 1A, 1B, and 2. The reference numerals are not intended to limit the claims.

Ko pertains to a capacitive absolute pressure sensor. As acknowledged in the Office Action, Ko does not disclose the concentration of an impurity at the top face of the diaphragm being equal to or greater than $1 \times 10^{19} \text{ cm}^{-3}$ and less than $9 \times 10^{19} \text{ cm}^{-3}$.

The Office Action asserts that such feature is disclosed in Okada. However, Okada provides no description of the specific concentration of the impurity in the diaphragm. For example, paragraph [0150] on page 8 of the specification of Okada, which is relied on in the Office Action as disclosing the concentration of the impurity in the diaphragm, merely describes "The fixed electrode 11c positioned internally on the lower surface of the fixed substrate 10c and the displacement electrodes 21c to 24c positioned internally on the upper surface of the flexible substrate 20c are formed by **diffusing impurity at a high concentration**". (Emphasis supplied). However, the specific concentration of the impurity is not disclosed in this paragraph. The Okada description of "diffusing impurity at a high concentration" does not mean the concentration of the impurity is equal to or greater than $1 \times 10^{19} \text{ cm}^{-3}$ and less than $9 \times 10^{19} \text{ cm}^{-3}$ as claimed in claim 1 of the present invention. Therefore, the above feature of the present invention is not disclosed or suggested by Okada.

Furthermore, as to claim 4, Applicants respectfully submit that Ko and Okada do not disclose or suggest an etch pit density on the top face of the diaphragm being equal to or less

than five per μm^2 . Indeed, the Office Action does not even assert that Ko or Okada disclose or suggest such a feature.

Furthermore, an object of the present invention is to provide a pressure sensor having high durability against overload pressure. Instead, Okada purports to provide a low cost detector which can detect physical quantities without temperature compensation. Moreover, in Okada, there is no description which suggests the improvement of the durability of the detector by the diaphragm. Therefore, the present invention and Okada are also different in their objects.

Furthermore, Applicants submit there is no motivation to combine Ko and Okada to achieve the structure or an object of the present invention.

Thus, Applicants respectfully submit that the § 103(a) rejection of claims 1 and 4 has been overcome.

CONCLUSION

For the foregoing reasons, Applicants submit that the patent application is in condition for allowance and request a Notice of Allowance be issued.

Respectfully submitted,

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